



# **SITE-SPECIFIC QUALITY ASSURANCE PROJECT PLAN**

**PIKE HILL COPPER MINE SUPERFUND SITE**

**CORINTH, VERMONT**

EPA Task Order No. 1, TDD #SA-01-21-10-0001

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**REGION I 8(a) SUPERFUND TECHNICAL  
ASSESSMENT AND RESPONSE TEAM (START)  
EPA Contract No. EP-S1-17-01**

FOR

**US Environmental Protection Agency  
Region 1  
5 Post Office Square, Suite 100  
Boston, Massachusetts 02109-3919**

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**BY  
NOBIS GROUP®**

(800) 394-4182

**Nobis Project No. 93201.18**

**Rev01 – February 14, 2022**



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**CORINTH, VERMONT**

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**CORINTH, VERMONT**

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## 1.0 PROJECT MANAGEMENT – ORGANIZATION AND RESPONSIBILITIES

### 1.1 Title and Approval Page

Site Name/Project Name:	Pike Hill Copper Mine	Title:	SSQAPP
	Superfund Site	Revision Date:	REV01 - 02/14/2022
Site Location:	Corinth, Vermont		

**Document Title:** *Site-Specific Quality Assurance Project Plan*

*Pike Hill Copper Mine Superfund Site*

**Lead Organization:** *U.S. Environmental Protection Agency (EPA)*

**Preparer's Name and Organizational Affiliation:** *Jennifer Lambert, Nobis Group®*

**Preparer's Address and Telephone Number:** *18 Chenell Drive*

*Concord, NH 03301; (603)-224-4182*

**Lead Organization's Project Manager:**

*February 14, 2022*

**Brett Kay**

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**Signature/Date**

*Brett Kay / Nobis Group®*

**Printed Name/Organization**

**Lead Organization's Project QA Officer:**

*February 14, 2022*

**Denis McGrath**

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**Signature/Date**

*Denis McGrath, CHMM / Nobis Group®*

**Printed Name/Organization**

**EPA Project Officer:**

**EDWARD HATHAWAY**

Digitally signed by EDWARD

**Signature/Date**

*HATHAWAY  
Date: 2022.02.21 10:39:13 -05'00'Edward Hathaway/EPA Project Manager*

**Printed Name/Organization**

**EPA QA Officer**

**BRYAN HOGAN**

Digitally signed by BRYAN HOGAN  
Date: 2022.02.24 14:44:26 -05'00'

**Signature/Date**

*TBD/EPA Chemist*

**Printed Name/Organization**

## **1.2 Introduction**

This Site-Specific Quality Assurance Project Plan (SSQAPP) was prepared by Nobis Group® (Nobis) for the United States Environmental Protection Agency (EPA) under contract EP-S1-17-01, Technical Direction Document (TDD) No. SA-01-21-10-0001. This SSQAPP addresses the quality procedures for the secondary data collected previously at the Pike Hill Copper Mine Superfund Site (the Site), located in Corinth, Vermont to support development of an Engineering Evaluation/Cost Analysis (EE/CA) and ultimately a Non-Time Critical Removal Action (NTCRA) to address unstable waste material that poses structural and significant ecological risk. A Site Locus Map is included as Figure 1-1. A Site Plan depicting pertinent site features is included as Figure 1-2.

The work described herein has been developed in general accordance with EPA and EPA – New England, Region I Quality Assurance Project Plan (QAPP) Guidance for secondary data (EPA, 2002 and EPA, 2009). This SSQAPP was developed based on available guidance documents from the EPA and available data from previous investigations.

## **1.3 SSQAPP Distribution List**

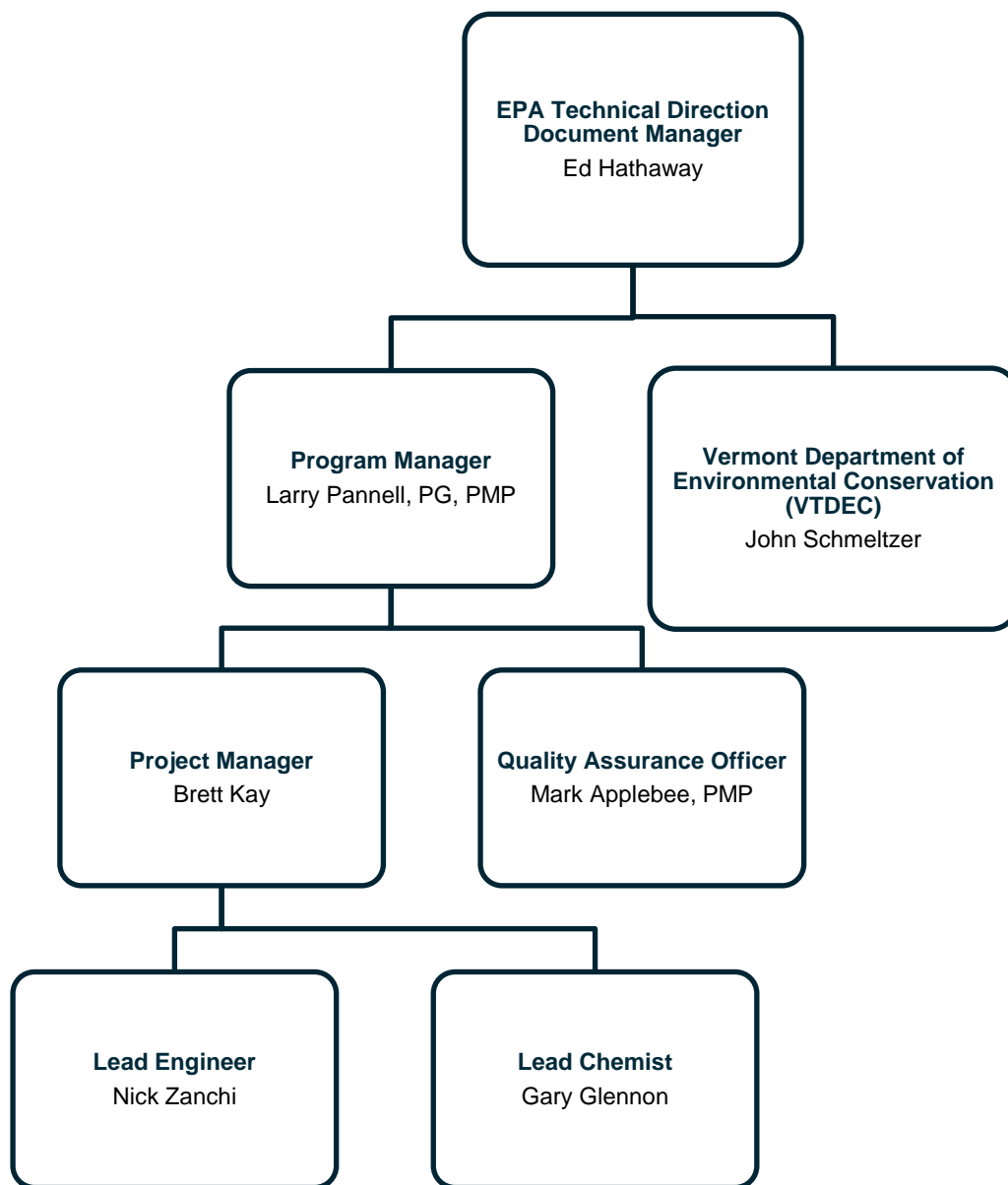
In accordance with EPA QAPP guidance (EPA, 2001), this section documents the SSQAPP Distribution List and document control of this SSQAPP.

The Distribution List (Table 1-1) documents who will receive copies of the approved SSQAPP. Typically, the final approved copies of the SSQAPP will be made available electronically in pdf format to the distribution list. Individuals listed in Table 1-1 receiving a copy of the SSQAPP will be provided with all applicable revisions, addenda, and amendments. Those individuals in receipt of a controlled copy are responsible for removing all outdated material from circulation, and for distributing revised or additional material to update any copies within their organization.

A complete copy of the SSQAPP and any subsequent revisions will be maintained on file and will be available to EPA upon request.

## **1.4 Project Organization**

Project organization and responsibility shall be as shown below. See distribution list (Table 1-1) regarding details of project personnel roles and contact information.



## 1.5 Purpose of Study, Background Information, and Problem Definition

Piles of waste materials (waste rock, flotation tailings, and magnetic separation waste) at the Site represent an ongoing source of acid rock drainage (ARD) impacts in surface water both on-Site and off-Site. In addition, the larger waste piles, particularly the northern waste rock piles, are being actively eroded by natural causes and human activities such as all-terrain vehicle (ATV) usage throughout the area. The secondary data sources evaluated under this SSQAPP will be used to develop removal action alternatives to address this source in an EE/CA. Specifically, secondary

data sources will be used to determine expected waste volumes and evaluate passive treatment technologies for leachate and surface water exiting the Site.

Limited analytical samples have been collected at the Site to date. Surface water, pore water, and sediment samples collected by USGS in August and October 2007 were collected under a QAPP following EPA guidance. Surface water samples collected by EPA in May and October 2021 were collected under a general Sampling and Analysis Plan (SAP) (EPA, 2021) and the EPA New England Regional Lab (NERL) responsible for performing the analytical testing operates under a QAPP. Therefore, these limited data sets will be used as the basis for EECA development. The Site contains the same geology, geochemistry, and general industrial/mining history as two other nearby Superfund sites, the Elizabeth Mine Superfund Site and the Ely Copper Mine Superfund Site. Both the Elizabeth Mine and Ely Mine have been extensively characterized and have Records of Decision (RODs) in place that also address waste material like the wastes at the Site. The remedial action at the Elizabeth Mine was completed in 2021 and the remedial design for Ely Mine was completed in 2020. Therefore, secondary information is available to support development of an EE/CA, the follow-on Action Memorandum and potentially a NTCRA.

## **1.6 Overview of Project Tasks**

Previously collected data will be used to help inform the conceptual site model (CSM) for the Site and support EE/CA development.

- Existing data will be used to estimate the volume of waste material to be addressed by a potential NTCRA. The initial waste volumes outlined in the most recent CSM (Nobis, 2019) will be refined, and will consider the accessibility of the waste material, particularly with regards to the need to leave buffer areas for sensitive receptors and habitats (i.e. bats) and to minimize impacts to historic foundations/features on-site.
- Existing data associated with the Site or conditions immediately downgradient of the Site will be used to characterize waste materials. Analytical data from previous sampling events will only be used in the evaluation if specific sample results can be located with a precision of +/- 50 feet.
- Experience with addressing similar waste materials at similar sites (Elizabeth Mine and Ely Mine) will be used qualitatively to inform remedial alternative development. Planning, remedial design, and construction summary documents from these two sites will be used.

## 1.7 Quality Objectives and Criteria

The overall data quality objectives for the EE/CA are as follows:

- Soil/waste material: data quality must be sufficient to distinguish between waste material (flotation tailings, waste rock, and magnetic separation waste material) and native soils.
- Surface water: data quality must be sufficient to distinguish between ARD-impaired and non-impaired surface water.

Data quality must be sufficient to assist with decision making regarding NTCRA endpoints (waste volumes and water bodies requiring diversion or passive treatment) but does not need to be of sufficient quality to support risk assessments or a final remedy for the Site.

For fixed lab/definitive data, the data quality objectives include the following:

- Precision: For available duplicate/replicate data, the following criteria should be implemented:
  - Solid samples (soil, sediment, wastes) – Relative Percent Difference +/- 50%.
  - Aqueous samples (surface water, groundwater, pore water) - Relative Percent Difference +/- 20%
- Accuracy: Accuracy of the data is not a significant quality criteria given the expected use of the data. If blanks/spikes were collected, blanks should be clean and spikes within laboratory-specified limits.
- Representative: Samples were collected from areas identified as impacted or potentially impacted.
- Comparability: Samples of like matrices should be analyzed by the same analytical method to the extent possible.
- Sensitivity: Analytical methods and associated limits are sufficient to determine waste material presence/absence, and/or surface water impacts are present/absent.



## **2.0 DATA SELECTION AND MANAGEMENT**

This section describes the process of selecting and managing data for the EE/CA and NTCRA.

### **2.1 Sources of Existing Data**

Table 2-1 provides a summary of existing data sources, including type of data, collection dates, reporting organization, report details, and database information (if available).

### **2.2 Intended Use of Existing Data**

Existing data will be used as described in the sections below.

#### **2.2.1 Evaluation of Surface Water/Leachate Data**

1. Existing surface water data will be used to identify areas of ARD-impacted surface water. Analytical surface water data and field measurements will be used, as both are available in spreadsheet format. A high level of analytical certainty is not required given the strong impacts of ARD on pH and metals concentrations.
2. Maximum/highly impacted surface water concentrations will be used to develop initial leachate/surface water removal alternatives. Similar to item 1 above, analytical surface water data and field measurements will be used. Concentrations are assumed to be similar to those currently being treated by the passive treatment system at the Elizabeth Mine, given the proximity of these sites and similarity in source chemistry, surrounding bedrock, terrain, and ecosystem.
3. Existing (previously completed) hydraulic studies will be used to determine the volume of water exiting the Site that may be considered for treatment.

#### **2.2.2 Evaluation of Waste Material Data**

Based on experience at the Elizabeth Mine and Ely Mine and the volume of material relative to the Site footprint, the presumptive remedy for waste material is to appropriately isolate the material from water (surface water and groundwater) by excavating, consolidating, and covering the material to minimize infiltration and reduce ARD generation as well as prevent erosion/sediment migration. Therefore, data will be used to evaluate the potential extent of waste material to be addressed.

1. Existing waste material (and native soil, if available) analytical results will be compared to results from Ely and Elizabeth Mine to confirm that the concentrations are generally similar (within an order of magnitude) for metals and anions for similar waste streams.
2. Field observations and the detailed topographic survey from 2017 will be used to estimate the volume of waste by comparing the existing ground surface contours to assumed bottom of waste (unimpacted native soil or bedrock) for areas of visible waste confirmed and observed during the site visits performed by Nobis and EPA in the fall of 2021.
3. Waste material excavation and the location of consolidation/isolation cells (if needed) will be constrained by the presence of sensitive receptors, to the extent practical. Historic feature documentation and requirements for buffer zones to protect bats will be used to identify areas that may require a different excavation approach or may need to be avoided entirely.

### **2.3 Limitations on Use of Existing Data**

Prior on-site sample collection and analyses were generally performed using a planning document such as a QAPP or SAP. The sampling approach and sample design are well documented and in some cases replicates were collected to help evaluate data variability. The existing Site data may be used to support future decisions related to human health or ecological risk and will be used to discriminate between highly impacted and non-highly impacted material in order to develop initial waste volumes and removal alternatives. Additional waste characterization may be required during an ensuing NTCRA, and a revised/new QAPP will be developed at that time.

Data for the Elizabeth Mine and Ely Mine were also collected under a federally approved QAPP, had documented levels of data validation, and are readily available in database format. Sampling methods, analyses, and data validation for samples from these sites are comparable to expected future confirmation sampling conducted as part of the NTCRA for the Site.

## **3.0 ASSESSMENTS AND OVERSIGHT**

The following subsections describe how data will be assessed and the quality control procedures for evaluating data.

### **3.1 Audits and Oversight**

The Nobis Project Manager will review or delegate review (to a senior scientist or engineer, as appropriate) of data evaluation and calculations in the EE/CA. Secondary data and design calculations will be included in the EE/CA as attachments or appendices and will be presented in such a manner that an outside reviewer can follow the full evaluation.

### **3.2 Documentation**

Documentation of the data review of any secondary analytical data will be included in a project memorandum to be included as an appendix or attachment to the EE/CA.

### **3.3 Data Issue Resolution**

Any issues with the data identified will be addressed first by reaching out to the primary author(s) or data-producing organization. If the data are not confirmed to be acceptable with regard to precision, accuracy, representativeness, completeness, comparability and sensitivity, the data will not be used except as a qualitative description of what it might indicate, and no decisions will be based on those data. Any data issues will be described in the documentation for the EE/CA described in Section 3.2.

## **4.0 DATA REVIEW - VERIFICATION, VALIDATION AND EVALUATION**

The following subsections describe how data sets will be reviewed and validated.

### **4.1 Comparison to Acceptance Criteria**

Previous Site data that have been validated will be used in the evaluation. Any previous data that have not been validated will be used qualitatively. Site data from the Elizabeth Mine and Ely Mine will only be used if they have been validated as described in the summary reports for remedial activities.

### **4.2 Data Evaluation**

The available secondary data will be evaluated by source area/location and media.

The data sets collected by USGS and EPA were collected and analyzed under an approved QAPP or SAP, respectively, using consistent field and analytical methods, and the EPA samples are

consistent with the recent sampling conducted at Elizabeth Mine, therefore the data will be used during development of the EECA. The data evaluation will consist of comparison of Site results for specific media and conditions (e.g. background vs. impacted surface water and different waste materials) to develop general chemistry and characteristics of impacted versus non-impacted materials. The data will not be used to characterize material for risk characterization and will be used only to develop significantly impacted (i.e. wastes to be addressed by a NTCRA) versus non-significantly impacted materials (to remain in place). Full characterization of materials will be performed as part of the NTCRA and is not required for development of initial EECA alternatives.

## **5.0 PROJECT SCHEDULE**

The project schedule will be as follows:

### **SSQAPP:**

- Draft due to EPA on 1/7/22.
- EPA comments on Draft to Nobis by 1/21/22.
- Final submittal to EPA on 02/14/22.

### **EE/CA:**

- Draft due to EPA on 03/04/22.
- EPA comments on Draft to Nobis by 3/11/22.
- Draft final due to EPA and stakeholders on 3/18/22.
- Stakeholder comments to Nobis by 3/25/22.
- Final due to EPA and stakeholders on 3/31/22.

## **6.0 PROJECT REPORTING**

Secondary data evaluation will be included in the EE/CA report as an attachment/appendix. The final EE/CA format is in development, but expected to include the following sections:

- Introduction: explains the purpose and scope of the EE/CA as well as the report organization.
- Site Characterization: develops the Site CSM, including physical description, potential receptors, history of Site use and investigations, and sources of contamination.

- **Identification of Removal Action Alternatives:** identifies performance objectives, applicable or relevant and appropriate requirements (ARARs), reviews relevant sites that are further along the investigation/remediation process, and performs an initial screening of viable technologies.
- **Analysis of Removal Action Alternatives:** describes the analysis approach, develops four (or more) alternatives (one no-action alternative as required by statute and three or more active alternatives) and performs an initial evaluation of each in terms of effectiveness, implementability, and cost.
- **Comparative Analysis of Removal Action Alternatives:** Compares the alternatives to each other in terms of effectiveness, implementability, and cost.
- **Evaluation of Post-Removal Site Control Required:** identifies the path forward for the Site and follow-on work required for alternative maintenance.
- **Recommended Removal Action Alternatives:** Selects a recommended alternative based on the comparative analysis and stakeholder input.
- **References:** includes all references, including secondary data sources, used to develop the EE/CA.
- **Figures:** will include all site drawings/sketches and conceptual plans needed to develop alternatives at a level of detail appropriate to an EE/CA.
- **Appendices:** includes the secondary data evaluation, engineering support data and calculations, and cost estimates.

## 7.0 REFERENCES

EPA, 2001. EPA Requirements for Quality Assurance Project Plans (EPA QA/G-5), Chapter 3. EPA/240/B-01/003, March.

EPA, 2002. Guidance for Quality Assurance Project Plans (EPA QA/G-5), Chapter 3. EPA/240/R-02/009, December.

EPA, 2021. Pike Hill Copper Mine Superfund Site, Corinth VT. Sampling and Analysis Plan for Collection of Water Samples for Analysis of Metals, Sulfates, and Alkalinity. May 10.

EPA New England, 2009. Quality Assurance Project Plan Guidance for Environmental Projects Using Only Existing (Secondary) Data. Revision 2. October 13.

# T A B L E S

TABLE 1-1  
DISTRIBUTION LIST  
PIKE HILL COPPER MINE SUPERFUND SITE  
CORINTH, VERMONT  
REV01 02/14/2022

Name/Role	Responsibilities	Phone	E-Mail
<b>Nobis</b>			
Denis McGrath Interim Corporate Health and Safety Officer	Oversees company-wide health and safety protocol for all Nobis field activities.	(978) 758-3744	<a href="mailto:dmcgrath@nobis-group.com">dmcgrath@nobis-group.com</a>
Brett Kay Project Manager	Reports to the Program Manager, monitors schedules, coordinates review of the SSQAPP, verifies that all data evaluation is complete and deliverables are submitted to EPA, coordinates with the reviewers in preparation of sampling plans and reports.	(603) 724-6223	<a href="mailto:bkay@nobis-group.com">bkay@nobis-group.com</a>
Nick Zanchi Lead Engineer	Evaluates secondary data and uses to develop assumptions regarding extent of excavation/fill needed; develops EE/CA alternatives.	(603) 513-7322	<a href="mailto:nzanchi@nobis-group.com">nzanchi@nobis-group.com</a>
Gary Glennon Lead Chemist and Chemistry QA/QC Manager	Confirms use of secondary analytical data; evaluates secondary data quality. Reviews and approves project planning documents; QA/QC corrective actions; and reports significant QA/QC issues/concerns to the PM.	(978) 703-6007	<a href="mailto:gglennon@nobis-group.com">gglennon@nobis-group.com</a>
<b>EPA</b>			
Ed Hathaway TDD Monitor	Manages the program for EPA.	(857) 829-8220	<a href="mailto:hathaway.ed@epa.gov">hathaway.ed@epa.gov</a>
<b>VTDEC</b>			
John Schmeltzer Project Manager	Manages the program for VTDEC.	(802) 249-5620	<a href="mailto:John.Schmeltzer@state.vt.us">John.Schmeltzer@state.vt.us</a>



TABLE 2-1  
DATA SOURCES  
PIKE HILL COPPER MINE SUPERFUND SITE  
CORINTH, VERMONT  
REV01 - 02/14/2022

Data Type	Organization	Report Title	Report Date	How Data Will Be Used	Limitations on Use	Notes
<b>Pike Hill Copper Mine Documentation</b>						
Field sampling memo	EPA	Pike Hill Mine Water Monitoring and Soil Sampling; October 2021	10/2021	Evaluate potential on-site surface water impacts	Field measurements; qualitative evaluation only	Field memo does not contain analytical results or coordinates for samples. See EPA analytical data submittal.
Field sampling memo	EPA	Pike Hill Mine Water Monitoring and Soil Sampling; May 2021	05/2021	Evaluate potential on-site surface water impacts	Field measurements; qualitative evaluation only	Field memo does not contain analytical results or coordinates for samples. See EPA analytical data submittal.
Analytical data submittal	EPA	No Title - Analytical Data Results from May and October 2021 SW and Soil Sampling performed by EPA.		Analytical soil and surface water data will be used to evaluate current conditions	Acceptable for use in EE/CA without restriction	Analytical data available in excel format.
Sampling plan	EPA	Pike Hill Copper Mine Superfund Site, Corinth VT; Collection of Water Samples for Analysis of Metals, Anion/cation and Alkalinity	05/2021	Confirm conditions under which data were collected	No limitations on data use	
Summary report	Nobis	Draft Conceptual Site Model Technical Memorandum, Pike Hill Copper Mine Site, Corinth, Vermont	06/2008	Baseline conceptual site model for evaluation and summary of existing information	Qualitative evaluation only	
Summary report	Nobis	Field Investigation Plan, Pike Hill Copper Mine Site, Corinth, Vermont	12/2019	Baseline conceptual site model for evaluation and summary of existing information	Qualitative evaluation only	
Summary report	PAL	Historic/Archaeological Mapping and Testing, Pike Hill Mines Site (VT-OR-27), Corinth, Vermont	02/2011	Identification of historically sensitive areas	Qualitative evaluation only	
Sampling plan	USGS	Quality Assurance Project Plan: Monitoring & Assessing Trace Element Loads in Pike Hill Brook, Corinth, Vermont	03/2005	Confirm conditions under which data were collected	No limitations on data use	
Surface water, mine waste geochemistry - report and data	USGS	Geochemical Characterization of Mine Waste, Mine Drainage, and Stream Sediments at the Pike Hill Copper Mine Superfund Site, Orange County, Vermont	2006	Determine waste material and leachate characteristics	Data in report format only; qualitative evaluation only;	
Surface water, mine waste geochemistry - report and data	USGS	Surface-Water Hydrology and Quality at the Pike Hill Superfund Site, Corinth, Vermont, October 2004 to December 2005	2007	Evaluate potential on-site surface water impacts	Full data set not included in report; qualitative evaluation only;	
Surface water, mine waste geochemistry - report and data	USGS	Sequential Extraction Results and Mineralogy of Mine Waste and Stream Sediments Associated with Metal Mines in Vermont, Maine and New Zealand	2007	Determine waste material and leachate characteristics	Data in report format only; qualitative evaluation only;	
Surface water geochemistry - report and data	USGS	Aquatic Assessment of the Pike Hill Copper Mine Superfund Site, Corinth, Vermont	2012	Develop background concentrations; determine impacted surface water	Samples collected under EPA approved QAPP. QC samples collected. Acceptable for use in EE/CA without restriction.	Analytical data available in excel format.

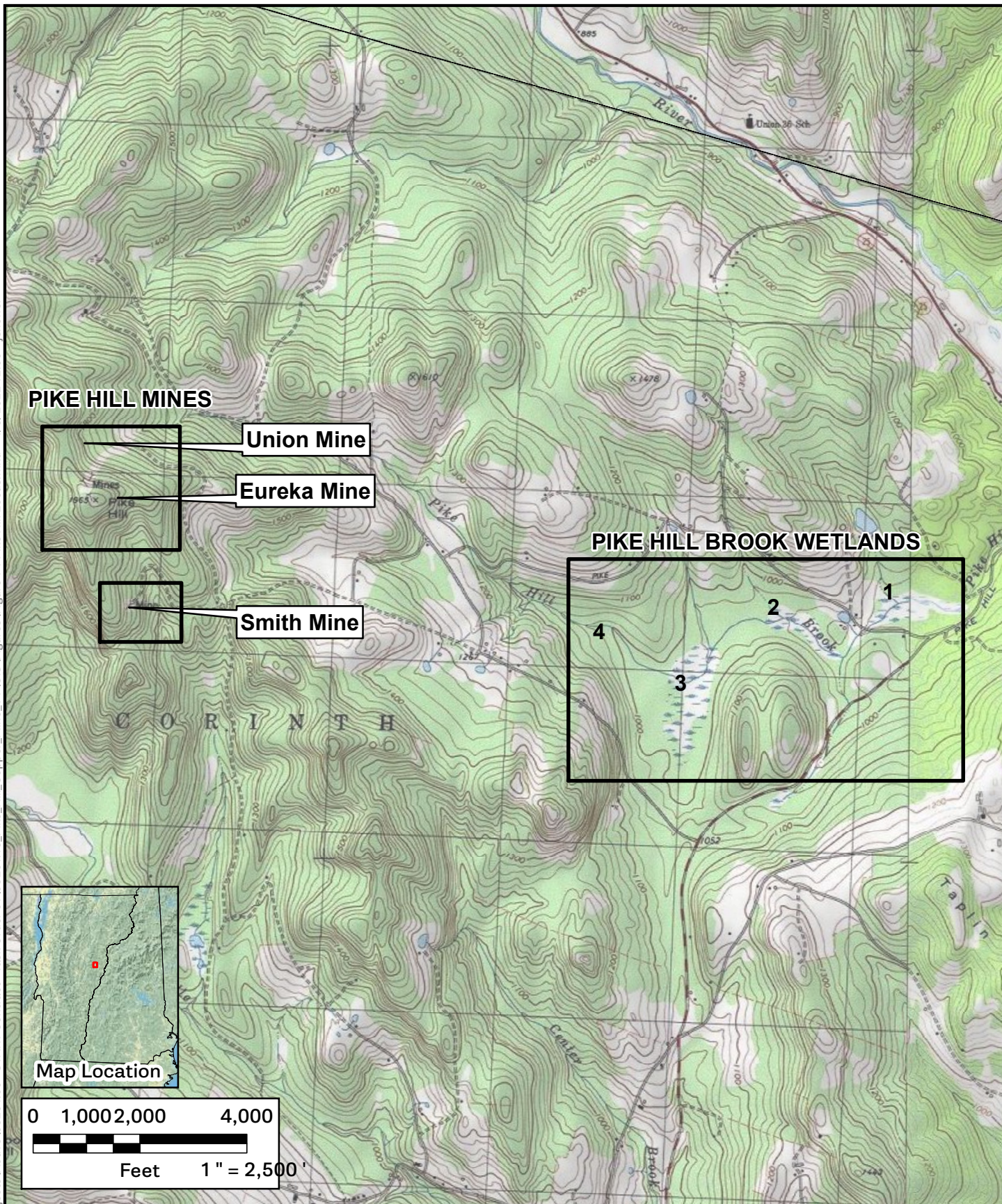
TABLE 2-1  
DATA SOURCES  
PIKE HILL COPPER MINE SUPERFUND SITE  
CORINTH, VERMONT  
REV01 - 02/14/2022

Data Type	Organization	Report Title	Report Date	How Data Will Be Used	Limitations on Use	Notes
Other Vermont Copper Mine Documentation: Elizabeth Mine						
Work Plan	Nobis	Construction Work Plan, Lord Brook Source Areas Phase 2 Remedial Action, Elizabeth Mine Superfund Site, South Strafford, Vermont	09/2020	Use decision points/excavation cutoff criteria as an analogue for Pike Hill work.	Data validated and acceptable for use.	
Summary report	Nobis	Lord Brook Source Areas Phase 2 Remedial Action Report & Phase 3 Non-Time Critical Removal Action Completion Report, Elizabeth Mine Superfund Site, 181 Mine Road, South Strafford, Vermont	09/2020	Use decision points/excavation cutoff criteria as an analogue for Pike Hill work.	Data validated and acceptable for use.	
Other Vermont Copper Mine Documentation: Ely Mine						
Remedial Design	Nobis	Technical Memorandum #10, Design Modifications Summary, Final Remedy Design, Ely Copper Mine Superfund Site, Operable Unti 01, Vershire, Vermont	12/2018	Use decision points/excavation cutoff criteria as an analogue for Pike Hill work.	Qualitative (non-analytical) data.	
Remedial Design	Nobis	Final Basis of Design, Ely Copper Mine Superfund Site, Remedial Design, Operable Unit 1, Vershire, Vermont	03/2019	Use decision points/excavation cutoff criteria as an analogue for Pike Hill work.	Qualitative (non-analytical) data.	
Other Documentation						
Guidance for developing NTRCA limits	VTANR	Forest Management Guidance for State Lands: Northern Long-eared Bats	03/2016	Used to determine acceptable extent of disturbance	Qualitative (non-analytical) data.	

# **F I G U R E S**



\\nobilis.local\shares\Projects\Active\93201.00 - START Contract - Task Order 01\93201.18 Pike Hill Copper Mine\_VT\GIS\Figures\Figure 1-1 Pike Hill Locus.mxd 1/5/2022 12:06 jsheffer



USGS Topographic Map  
West Topsham, VT.  
Revised 1981



#### FIGURE 1

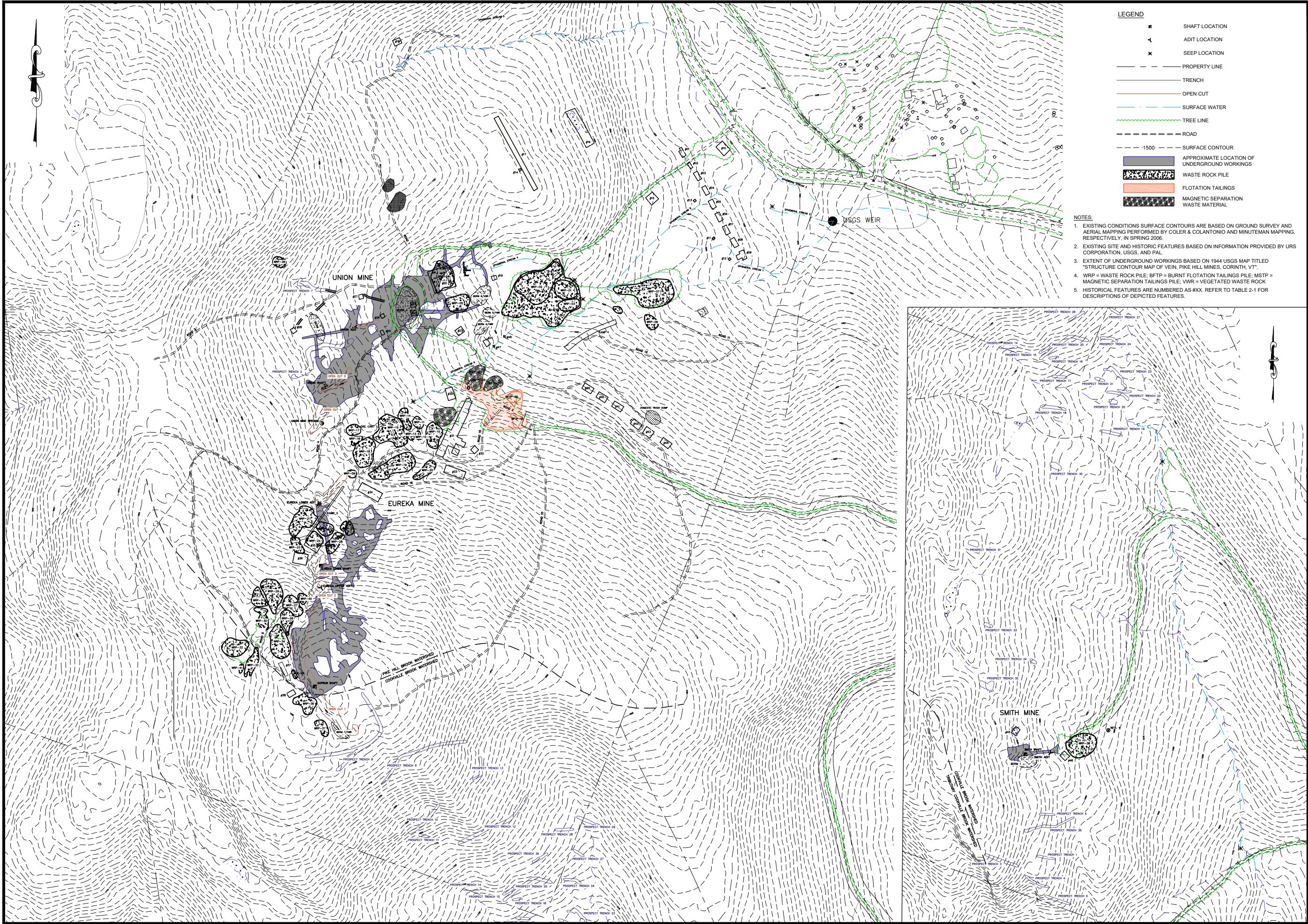
**SITE LOCUS**  
**PIKE HILL COPPER MINE**  
**SUPERFUND SITE**  
**CORINTH, VERMONT**

PREPARED BY: JTS  
PROJECT NO. 93201.018

CHECKED BY: JL  
DATE: JANUARY 2022



RA:80000 Task Orders\80111 Pike Hill Copper Mine\CAD\dwg\80111.01-SITE.dwg 4/17/2017 2:55 PM



NOT ISSUED  
FOR  
CONSTRUCTION

PIKE HILL COPPER  
MINES  
  
SUPERFUND SITE  
CORINTH, VERMONT

NO.	DATE	DESCRIPTION
REVISIONS		

DATE: FEBRUARY 2017  
NOBIS PROJECT NO. 80111.01  
DRAWN BY: BJK  
CHECKED BY: AB  
CAD DRAWING FILE:  
80111.01-SITE.dwg  
SHEET TITLE

SITE SKETCH